

**CLAIMS**

1. A cordless telephone-to-sound card interface adapter for providing mobility to an end user during voice communications over the Internet, comprising:
  - 5 a housing unit;
  - a hybrid transformer circuit carried in the housing unit;
  - the hybrid transformer circuit including:
    - a first hybrid transformer;
    - a second hybrid transformer coupled to the first hybrid transformer;
    - 10 an impedance matching circuit coupled to the first and the second hybrid transformers;
    - a telephone jack coupled to the hybrid transformer circuit for coupling to a cordless telephone system using a telephone cord;
    - a speaker plug coupled to the hybrid transformer circuit which extends from the housing unit and is configured to connect with a speaker jack of a computer sound card; and
    - 15 a microphone plug coupled to the hybrid transformer circuit which extends from the housing unit and is configured to connect with a microphone jack of the computer sound card.
- 20 2. The interface adapter of claim 1, wherein the hybrid transformer circuit consists of passive components.
3. The interface adapter of claim 1, wherein the hybrid transformer circuit matches impedances from the cordless telephone system and the computer sound card for
  - 25 voice echo cancellation.
4. The interface adapter of claim 1, wherein the speaker and the microphone plugs comprise 1/8" miniplugs.
- 30 5. The interface adapter of claim 1, wherein the impedance matching circuit has an impedance of between about 350 – 500  $\Omega$ .

6. The interface adapter of claim 1, further comprising:  
the first hybrid transformer including a coil A which is inductively coupled with coils B and C formed along the same core; and

5 the second hybrid transformer including a coil F which is inductively coupled with coils D and E formed along the same core.

7. The interface adapter of claim 1, further comprising:  
first mutually-coupled coils A and C of the first hybrid transformer;  
10 second mutually-coupled coils B and D of the first hybrid transformer which are formed along the same core as the first mutually-coupled coils A and C;  
first mutually-coupled coils E and G of the second hybrid transformer; and  
second mutually-coupled coils F and H of the second hybrid transformer which are formed along the same core as the first mutually-coupled coils E and G.

15

8. The interface adapter of claim 1, further comprising:  
the first hybrid transformer including a coil A which is inductively coupled with coils B and C formed along the same core;

the second hybrid transformer including a coil F which is inductively coupled with  
20 coils D and E formed along the same core;

a first terminal of the coil C and a first terminal of the coil E coupled to the telephone jack;

a second terminal of the coil C coupled to a second terminal of the coil E;

first and second terminals of the coil A coupled to the speaker plug;

25 first and second terminals of the coil F coupled to the microphone plug;

a first terminal of the coil B coupled to a second terminal of the coil D;

a second terminal of the coil B and a first terminal of the coil D coupled to the impedance matching circuit.

30 9. The interface adapter of claim 1, further comprising:

first mutually-coupled coils A and C of the first hybrid transformer;

second mutually-coupled coils B and D of the first hybrid transformer which are formed along the same core as the first mutually-coupled coils A and C;

first mutually-coupled coils E and G of the second hybrid transformer;

second mutually-coupled coils F and H of the second hybrid transformer which are formed along the same core as the first mutually-coupled coils E and G;

a first terminal of the coil D and a first terminal of the coil F coupled to the telephone jack;

a second terminal of the coil D coupled to a second terminal of the coil F;

a first terminal of the coil A and a first terminal of the coil B coupled to the speaker plug;

a first terminal of the coil G and a first terminal of the coil H coupled to the microphone plug;

a first terminal of the coil C coupled to a second terminal of the coil E;

a second terminal of the coil C and a first terminal of the coil E coupled to the impedance matching circuit.

10. The interface adapter of claim 1, further comprising:

wherein the first hybrid transformer is rotated 90° out-of-phase with the second hybrid transformer.

11. The interface adapter of claim 1, further comprising:

a Universal Serial Bus (USB) interface for supplying a bias voltage to the cordless telephone system through the interface adapter.

12. A cordless telephone-to-sound card interface adapter for providing mobility to an end user during voice communications over the Internet, comprising:

a hybrid transformer circuit consisting of passive components;

a telephone interface coupled to the hybrid transformer circuit for coupling to a cordless telephone system;

a speaker plug coupled to the hybrid transformer circuit which is configured to connect with a speaker jack of a computer sound card; and

a microphone plug coupled to the hybrid transformer circuit which is configured to connect with a microphone jack of the computer sound card.

13. The interface adapter of claim 12, wherein the hybrid transformer circuit  
5 matches impedances from the cordless telephone system and the computer sound card for voice echo cancellation.

14. The interface adapter of claim 12, wherein the hybrid transformer circuit comprises:

10 a first hybrid transformer;  
a second hybrid transformer coupled to the first hybrid transformer; and  
an impedance matching circuit coupled to the first and the second hybrid transformers.

15 15. The interface adapter of claim 14, further comprising:  
wherein the first hybrid transformer is rotated between  $45^\circ$  –  $135^\circ$  out-of-phase with the second hybrid transformer.

16. The interface adapter of claim 12, wherein the hybrid transformer circuit  
20 comprises:

a first hybrid transformer;  
a second hybrid transformer coupled to the first hybrid transformer; and  
an impedance matching circuit coupled to the first and the second hybrid transformers; and  
25 wherein the impedance matching circuit has an impedance between about 457 – 467  $\Omega$ .

17. The interface adapter of claim 12, further comprising:  
a Universal Serial Bus (USB) interface for supplying a bias voltage to the cordless telephone system through the interface adapter.

30

18. A hybrid transformer circuit for a cordless telephone-to-sound card interface adapter, comprising:

a first hybrid transformer having a coil A which is inductively coupled with coils B and C formed along the same core;

5 a second hybrid transformer having a coil F which is inductively coupled with coils D and E formed along the same core;

an impedance matching circuit;

a first terminal of the coil C and a first terminal of the coil E for coupling to a cordless telephone system;

10 a second terminal of the coil C coupled to a second terminal of the coil E;

first and second terminals of the coil A for coupling to a speaker jack of a computer sound card;

first and second terminals of the coil F for coupling to a microphone jack of the computer sound card;

15 a first terminal of the coil B coupled to a second terminal of the coil D; and

a second terminal of the coil B and a first terminal of the coil D being coupled to the impedance matching circuit.

19. The hybrid transformer circuit of claim 18, which consists of passive  
20 components.

20. The hybrid transformer circuit of claim 18, wherein the hybrid transformer circuit matches impedances from the cordless telephone system and the computer sound card for voice echo cancellation.

25

21. The hybrid transformer circuit of claim 18, wherein the impedance matching circuit has an impedance of between about 350 – 500  $\Omega$ .

22. The hybrid transformer circuit of claim 18, wherein the impedance matching  
30 circuit has an impedance of between about 350 – 500  $\Omega$  and comprises a resistor having a 1% tolerance or less.

23. The hybrid transformer circuit of claim 18, wherein an impedance matched to the cordless telephone system is about  $450\ \Omega$ , an impedance matched to the microphone jack is at least  $10K\ \Omega$ , and an impedance matched to the speaker jack is about  $600\ \Omega$ .

5

24. The hybrid transformer circuit of claim 18, further comprising:  
a Universal Serial Bus (USB) interface coupled to one of the first terminals of coils C and E for supplying a bias voltage to the cordless telephone system.

10 25. A hybrid transformer circuit for a cordless telephone-to-sound card interface adapter, comprising:

a first hybrid transformer;  
a second hybrid transformer;  
an impedance matching circuit;

15 first mutually-coupled coils A and C of the first hybrid transformer;  
second mutually-coupled coils B and D of the first hybrid transformer which are formed along the same core as the first mutually-coupled coils A and C;

first mutually-coupled coils E and G of the second hybrid transformer;

second mutually-coupled coils F and H of the second hybrid transformer which are  
20 formed along the same core as the first mutually-coupled coils E and G;

a first terminal of the coil D and a first terminal of the coil F coupled to the telephone jack;

a second terminal of the coil D coupled to a second terminal of the coil F;

a first terminal of the coil A and a first terminal of the coil B coupled to the speaker  
25 plug;

a first terminal of the coil G and a first terminal of the coil H coupled to the microphone plug;

a first terminal of the coil C coupled to a second terminal of the coil E; and

a second terminal of the coil C and a first terminal of the coil E coupled to the  
30 impedance matching circuit.